

Constructing an R40 Floor



The 4" thick reinforced slab floors in the house and sunroom are each poured into a "bathtub" of 4" thick structural extruded polystyrene (XPS) insulation (two 2-inch layers with overlapping seams). XPS has an insulation rating of 5/inch, resulting in an overall R20 rating. Adding the natural heat-flow resistance of the underlying soil increases the effective heat flow resistance to R41.

Holes are drilled for various pipes and drains that extend through the floor. Any gaps between pipes and holes were then sealed with spray-foam insulation before the slab was poured. The structural foam insulation material has a compression rating approximately the same as the ground on which it rests, so slab height is quite stable.

The yellow plastic sheet is the extension of the air/water barrier protecting both concrete and insulation. It is later sealed to the foundation stem wall and to the wall sheathing to create a continuous air and water barrier connection between floor and walls.

The material cost for the 4" thick insulating layer (at retail price) is approximately \$2.00/square foot. However, halving the insulation thickness in that portion of the floor that is more than 5' in from the edge reduces cost by 30% with only a 9% decrease in R rating, while eliminating the insulation altogether in that portion reduces the cost by 60% with a 25% reduction in R rating.